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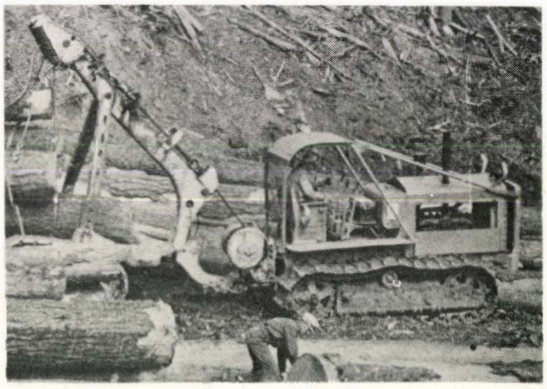
NORTHEASTERN LOGGERS' HANDBOOK

by

Fred C. Simmons

PRELIMINARY REVIEW EDITION



Easier and Safer Work

Greater Production (more pay) and Better Living Conditions

SECTION 15:— WINTER HAULING

NORTHEASTERN FOREST
EXPERIMENT STATION

United States Department of Agriculture

FOREST SERVICE
NORTHEASTERN FOREST EXPERIMENT STATION

614 Bankers Securities Building
Philadelphia 7, Pennsylvania

V. L. HARPER, DIRECTOR

FOREST UTILIZATION SERVICE
James C. Rettie, Chief

If you want to be a mechanic, you will easily find plenty of good books which will tell you what you need to know. You will also find plenty of instructors and training shops.

What about the young man who wants to make his living by logging? For him there is no good source of information to which he can turn. The books and courses on logging are for the logging engineers--not for the fellow who uses the axe and crosscut.

Why shouldn't there be a simple illustrated handbook which will tell the young woodsman (or the green woodsman) what he needs to know about the care and use of his tools and the best of the old and the new techniques of, and devices for logging? He needs to know the "tricks of the trade" as much as anyone.

We hope that these pages, together with other short papers like it, will finally be put together in a printed NORTHEASTERN LOGGERS' HANDBOOK. We are putting it out in this form first because there seems to be an urgent need for this sort of information; and because we need the help and advice of persons who know about logging in our region before printing. We want the experienced logger to tell us what important things we have missed and where our advice is not good. We want the young man going into the woods for the first time to tell us what parts of it he finds hard to understand, to suggest how it can be made more useful to him. We would like the equipment manufacturers to check our recommendations for use of their products and tell us about new devices they are developing.

Please send criticisms, questions and suggestions to: The Director, Northeastern Forest Experiment Station, 614 Bankers Securities Building, Philadelphia 7, Pa. Additional copies of this and other publications in this series can be obtained from the same address.

1947

SECTION 15: LOG HAULING IN WINTER

By Fred C. Simmons *

Over a large part of the Northeast, hauling logs out of the woods is done mostly in the winter. There are a number of reasons for this. Generally haul roads are more easily and cheaply constructed for winter use. Snow and ice are provided on the spot by Nature and it is relatively easy to make a smooth firm road out of them.

Log hauling with horses

In the northern tier of states, swamps are frozen hard and lakes are frozen over for several months every winter; this makes it possible to get into timbered areas that could never be logged economically otherwise. Also, sliding resistance of heavy loads on good iced roads is less than the rolling resistance of the same loads on dirt and gravel roads--even with the best of wheeled vehicles. The same loads can be pulled with less power in the winter.

Log hauling with tractor

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* Specialist in logging and primary processing.
Forest Utilization Service

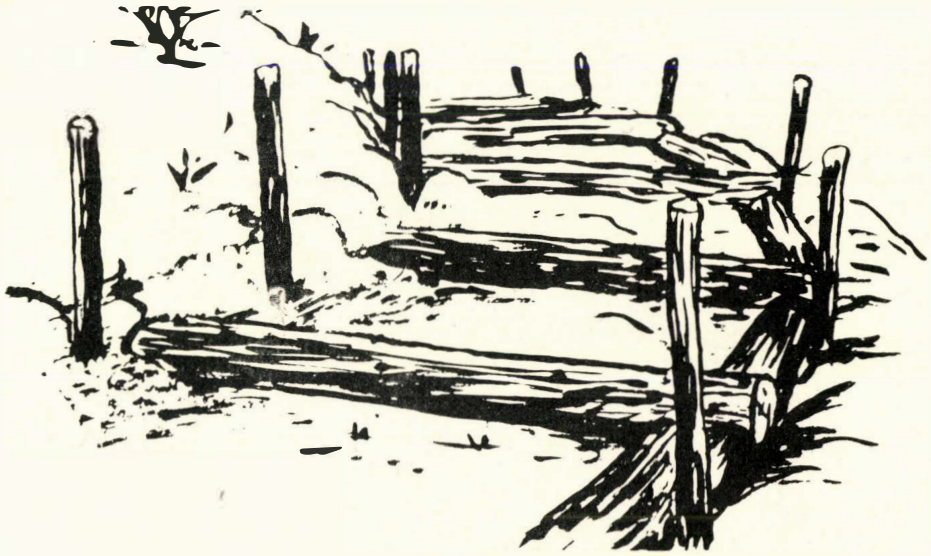
WINTER HAUL ROADS

Winter haul roads are generally temporary affairs, designed for only one season's hauling. They depend on snow or ice for their surface, and are not intended for use at any other season of the year. Consequently, in most winter haul road construction, clearing is not done completely as for all-season hauling; grading is very rough; and cross skids may be laid as much as 3 feet apart.

Snow Roads

The general principles of the construction of snow roads are simple. First, a route is cleared through the woods. Gradient is the main consideration. For the major part of the haul, a gentle down grade--2 percent to 10 percent--with wide curves and long tangents is desirable. A gentle down grade is particularly useful at loading points; it helps to overcome the inertia of the load and to break loose sled runners that might be frozen in during the loading. Short, steep pitches should be avoided if at all possible. Where there is no alternate route, it is best to choose the shortest way down and install a snubbing device to keep loads under control. Uphill grades and even level stretches should also be avoided.

The type of ground to be traversed is a minor consideration. Side hills can be cross-skidded with a minimum of dirt moving. The type of cross skids most frequently used is illustrated here.



Cross-skids for a side hill

The side-hill logs, which should be culls or of undesired species, are laid along the slope on the downhill side of the road. The stakes holding them in place are made long enough so that they can be seen above the snow.

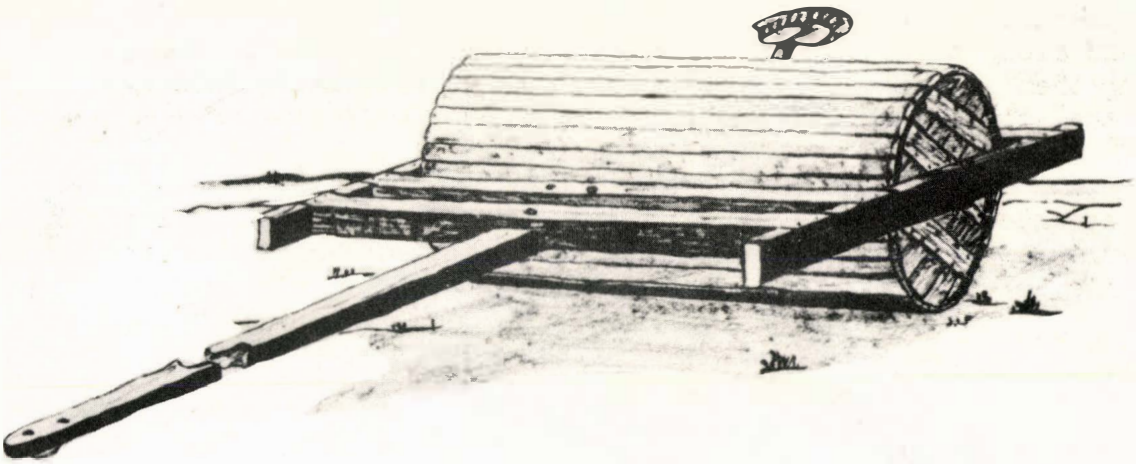
Cross skids are often used to traverse swamps, rocky places, and even areas covered by stumps. Two side logs are laid, and cross skids are laid across them, usually in notches made with an ax at the desired intervals.

Cross-skids over swamps, stumps or boulders

True corduroy (poles laid close together) is ordinarily used only in places where there are springholes that will never freeze tightly or on bridges.

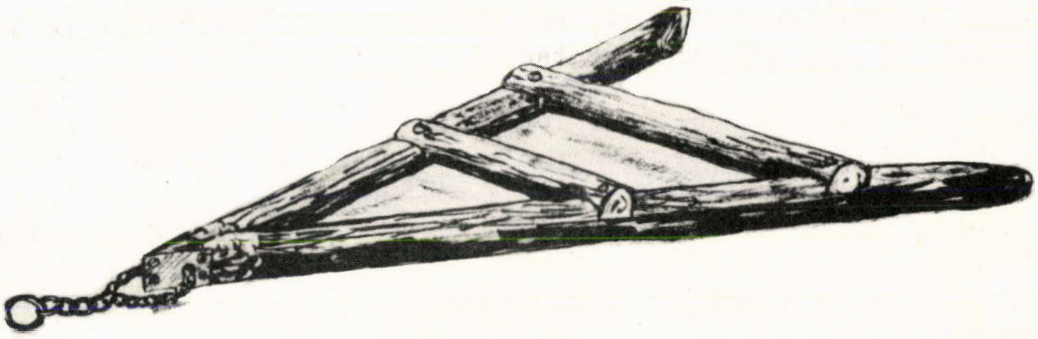
The width of a snow road depends primarily on the kind of motive power to be used in moving the loads, and to some extent on the loads themselves. A one-horse road is usually about 6 to 8 feet wide, a two-horse road 10 to 12 feet wide and a tractor road anywhere from 10 to 20 feet. These are all one-way roads. Many such roads are designed to be used by only one vehicle. Where more than one vehicle is to use the road, a narrow "go-back road" is usually made for the empty returning vehicles. This go-back road may have steeper pitches and more abrupt curves than the main haulroad, and consequently is cheaper to construct. Two-way roads are, of course, more than twice as wide.

Clearing and corduroying or cross-skidding of a snow road are best done in the summer and early fall months, before the first heavy snows. When the heavy snow falls, the first step is to compact it. This is done by dragging a roller or a V-plow over it.



Home-made roller

The V-plow is merely a couple of poles bolted together into a V, with spreader bars bolted across them to keep their tails apart. Hardwood logs or chunks can be laid on top to increase the weight.

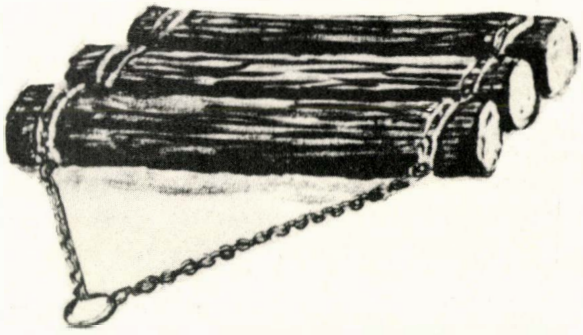


V plow

The V-plow does considerable grading as well as compacting and so, when the snow is not too deep, it is usually preferred to the roller.

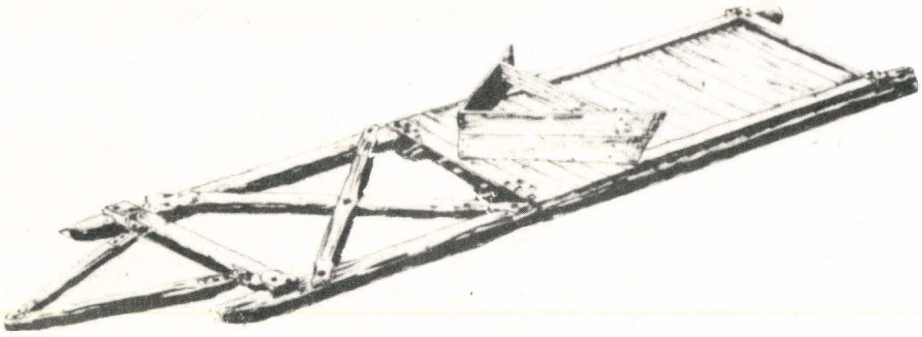
Another simple compacting device still used frequently is a heavy, topped softwood tree with its limbs left on. This is dragged by the butt over the road.

A snow drag is another tool frequently used for this initial breaking out and compacting job on miner roads. Snow drags are usually made from short hardwood logs. A crawler tractor usually provides the best type of power for this breaking-out job.



Snow drag made from short hardwood logs

When heavy snows come before the ground has had a chance to freeze solidly, some of the snow must be plowed away, especially in boggy places, to let the frost get into the ground. The V-plow or snow drag are good tools for this job.



Snow road scraper

When the road of compressed snow is established it can be put in shape for hauling with a simple home-made road scraper. Such a scraper does not slue around as much as a V-plow, but it is more difficult to pull over rocks, stumps, and other obstacles.

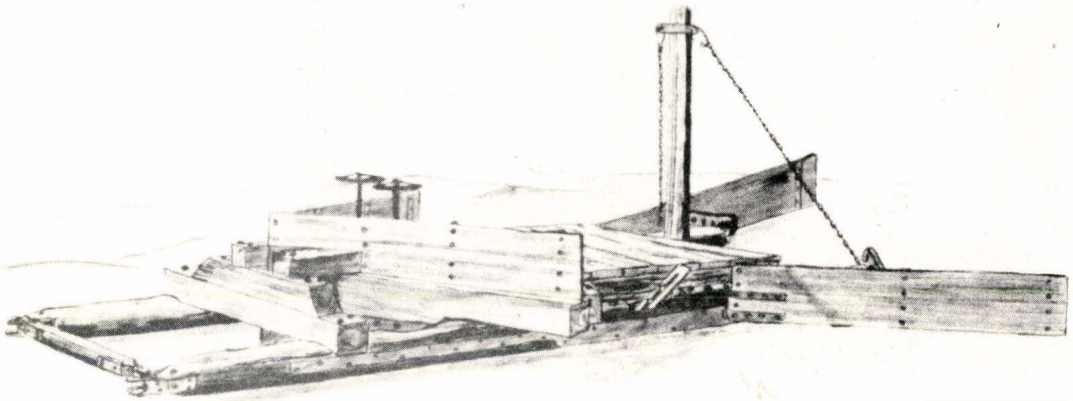
Snow roads are used for practically all branch roads traveled by sleds pulled by horses or tractor. Main roads are frequently iced. This makes it possible to pull larger loads with these types of motive power. In recent years trucks have been used more and more to pull trains of loaded sleds, and all truck roads must be iced.

Iced Roads

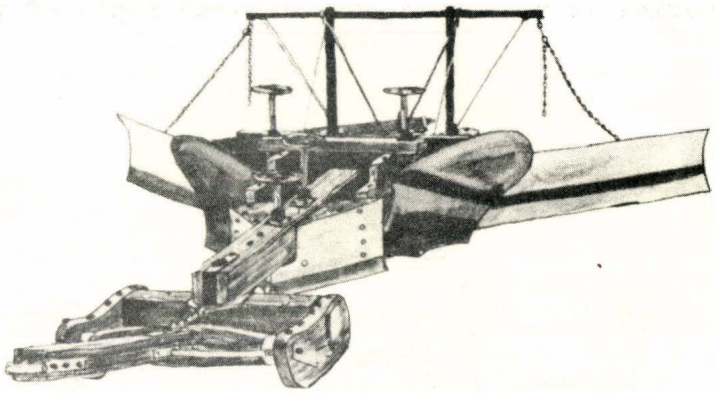
The preparation and maintenance of iced roads is much more difficult and expensive. The surface of a good iced road must be close to the original ground level. Otherwise the foundation will melt out during spells of warm weather. A much better job of clearing and ground preparation is necessary. Side-hill cuts must be made, instead of building out from the surface of the slope as with snow roads. Consequently iced roads are usually made where they can be used for two or more seasons.

In making an iced road, a drag is used first to break out the road. Then the road is scraped with a scraper similar to the kind used for snow roads. After the road has been broken out and scraped, a loaded sled is usually pulled over it a few times to further compact the surface. Water is sprinkled over the road to get an iced surface, and ruts are cut to provide tracks for the sleds.

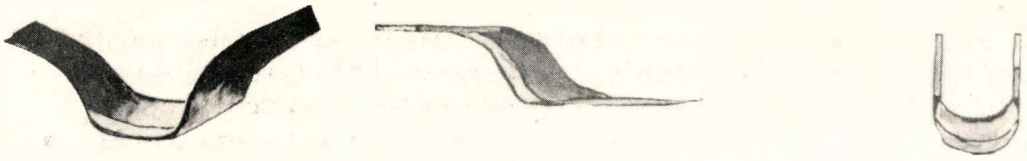
The ruts are cut in iced roads to keep the sleds from slueing around. Sometimes the initial ruts are cut in the bare earth, when it begins to freeze. In any case they are cut before the snow gets too deep. Elaborate rutters have been devised, some home-made and some commercial products. Most rutters have flat tool-steel blades. Usually the blades are adjustable, and removable for sharpening.



Home-made rutter with adjustable steel planer-type knives

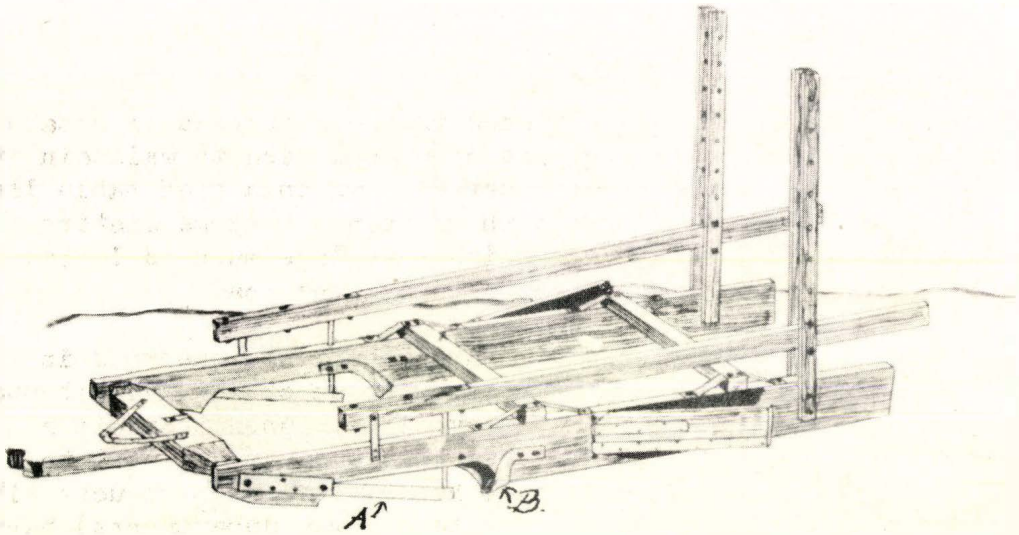


Commercial model rutter



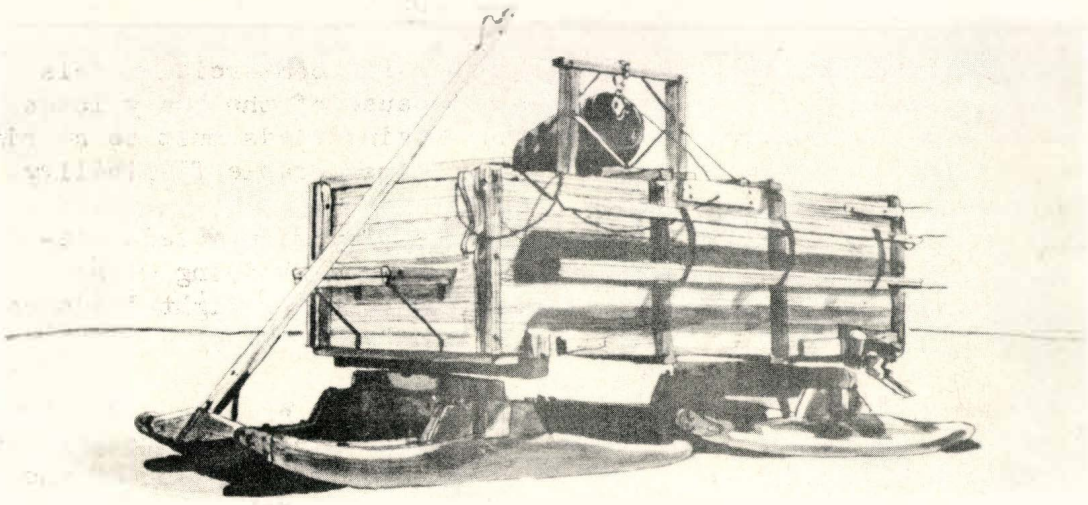
Side Top Front

Rutter blade



Unusual type of home-made rutter used in the Lake States: A, false runners to regulate depth of cut; B, tempered tool-steel blade

The sprinkling is best done when the weather is not too cold. If the freezing at the surface is too rapid, the desired depth of ice cannot be obtained.



A horse-drawn sprinkler

Many sprinklers are now mounted on motor trucks; and because of the greater speed at which they travel, fewer water holes must be maintained. Some companies build portable pumphouses to expedite refilling of the sprinkler tanks. These contain a centrifugal pump, a gasoline motor to run it, and a stove for the apparatus and the pumphouse man. The pumphouse is usually mounted on a sled with double-ended runners, so it can be pulled either way.

Road Maintenance

The snow road is easy to maintain. Once the road surface is established, the scraper is practically the only tool used to maintain it. Scraping is needed to keep the road surface down to a reasonable level, largely to simplify loading. Even with scraping, in some winters the snow road level will build up so high that logs must be lifted 9 feet or more from ground level to the top of the load.

Iced roads require more maintenance. During hauling, the road is torn up during the day by tractor treads or truck chains, and it must be sprinkled and rutted practically every night. When there is a heavy snowfall, plowing is needed before the road can be put into condition for hauling. In recent years heavy tractors or trucks with nose plows (similar to those used by state highway departments) have been used more and more for such work. After plowing, the road must be sprinkled and re-rutted.

Hand maintenance is also necessary. Dirt, bark, and manure must be cleaned out of the ruts. Hand shoveling, either into or out of the road, is needed to supplement the work of the plows and scrapers. Hand work with the ax is often necessary to remove obstructions from the ruts.

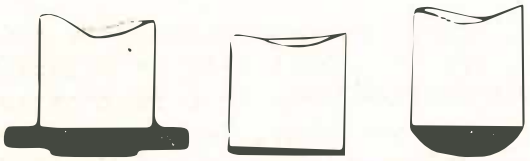
CONSTRUCTION OF SLEDS

Most logging sleds are home-made, although a few commercial models have been on the market for many years. Because of the heavy loads they carry and the racking they receive, logging sleds must be sturdily constructed and at the same time must have considerable flexibility.

The basic sled patterns are similar to those of yarding sleds (described in Loggers' Handbook, Section 10, "Ground Skidding with Horses"). This type of sled is all right for hauling light loads on a two-sled rig with horses.

For the heavier hauling behind tractors or trucks, which is now common in logging operations in the Northeast, much heavier and stronger sleds are called for. Greater care must be given to the selection of the runners. Oak is the favorite wood for this, and birch is a close second. Runners with a natural curve, often obtained from the butt of a tree, are preferred.

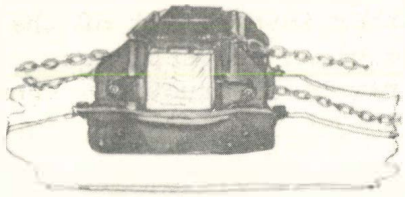
The runners are usually shod with steel, since it wears much better than cast iron. Cast iron shoes, however, run better on dirt or manure that may collect in the ruts. Shoes may be flat or half oval; the latter is generally preferred. For use on soft snow roads the runners are sometimes widened with "moccasins." These "moccasins" may be of either wood or steel.



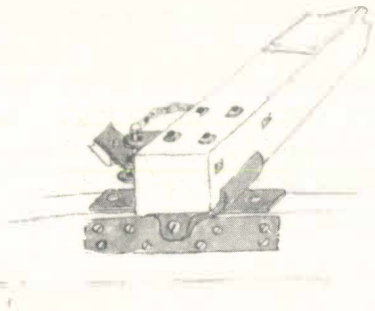
Moccasin Flat Half oval

Types of sled-runner shoes

The knees which attach the runners to the cross beams are frequently iron castings. The McLaren knee and the Lombard knee are two patterns of such castings which have the needed strength and flexibility.



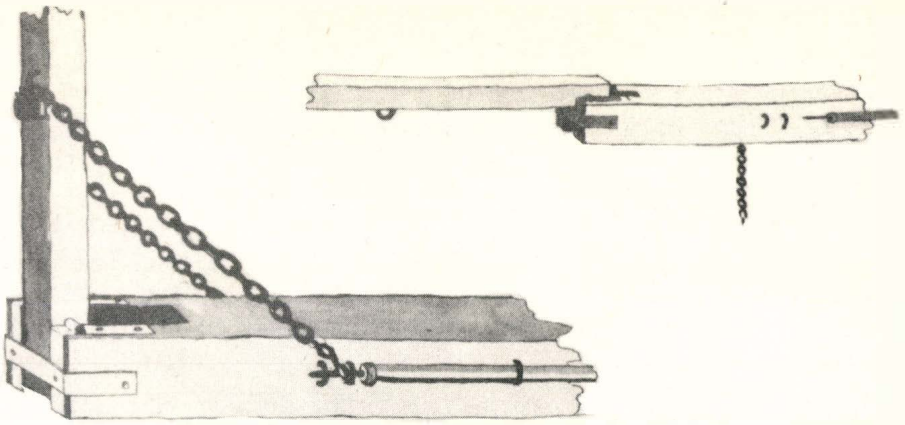
McLaren knee type



Lombard knee type

The cross beams are made of oak, rock elm, or birch. They taper slightly from the center to the ends, so that their only contact with the bunk--which carries the load--is at the center. The bunks are often made of seasoned softwood; spruce is the favorite species. The bunks also are tapered on the underside. The center point, through which the king bolt runs, is frequently armored with steel plates on both bunk and cross beam to reduce wear and to make steering easier.

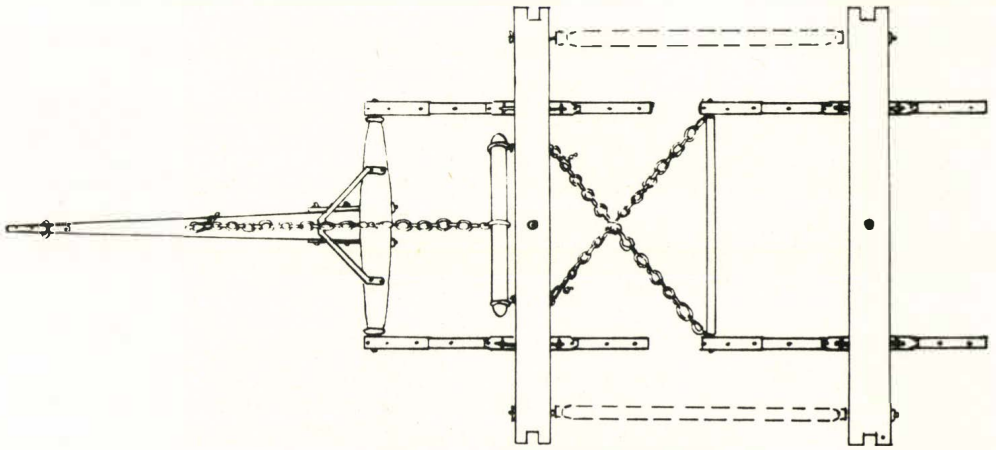
Stakes for holding the logs on the bunks are preferable to merely chaining them on. Generally a larger load can be carried on a staked sled. The stakes also make the sled easier to load and unload.



A safe quick-release device

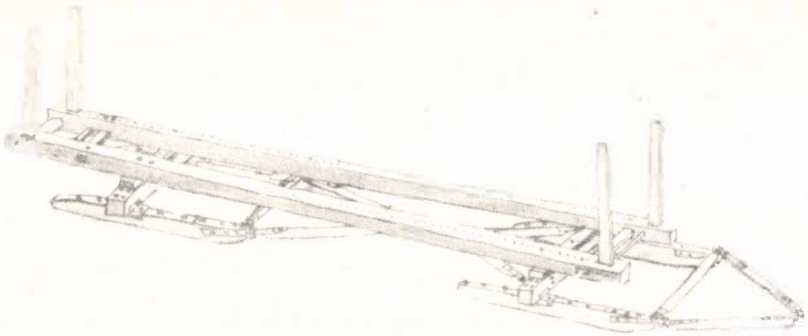
Quick release devices similar to those now used on many logging trucks are used on sleds. The one illustrated here safeguards the worker. When he wants to release the load from the sled, he pulls on the pole strapped to the side of the bunk. This pulls out the pin which holds the end of the chain supporting the stake. The chain flips around; and the stake drops on its hinges, forming a skid down which the logs can roll. Since the operator is on the other side of the sled, he is well out of the way of the rolling logs. This is a great improvement over the old fid hook and chain method; the operator had to stand on the unloading side to knock the fid hooks loose, and this was responsible for very serious accidents.

The use of sleds depends on the type of logs to be hauled.



Cross-chain tandem hitch

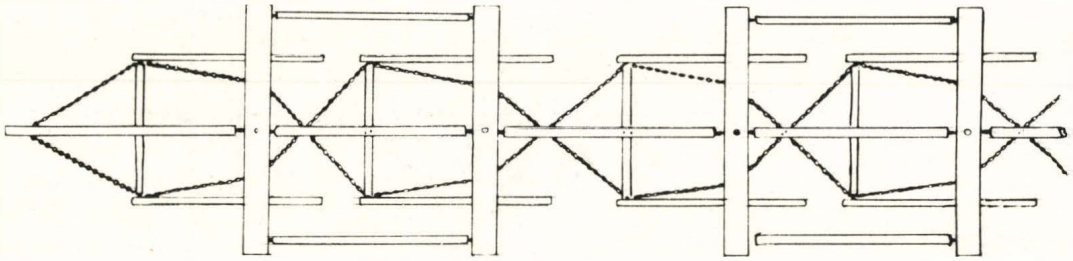
For hauling long logs on a two-sled rig, the tandem hitch may be merely a set of cross chains. Sway bars (shown in the illustration by dotted lines) are frequently used to help keep the sleds in alinement.



Pulpwood rack

For hauling short bolts of pulpwood, a set of racks is put on the sleds. A single rack for 4-foot bolts is shown here. Such racks are ordinarily loaded by hand. They are unloaded easily by running one side of the sled on a platform, which tilts the sled and spills the load.

The use of tractors or trucks makes it possible to haul long trains of sleds out of the woods. Either poles or chains, or a combination of the two, are used in hitching sleds together into a train. The strongest method is chains extending from bunk to bunk, as shown here.

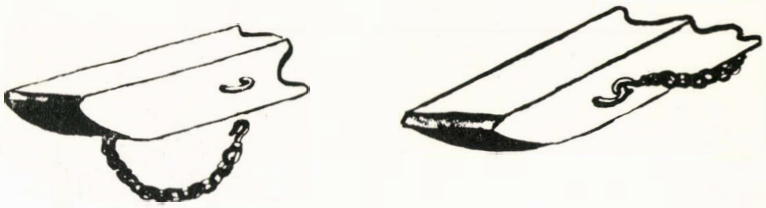


Sled-train attachment

A long link (A) is inserted in the chain where it goes around the front rollers on each sled, so that no heavy pull is put on the gudgeon pins. When this system is used, bumper poles (B) are needed to keep the sleds from running up on each other on down grades or when sudden stops are made.

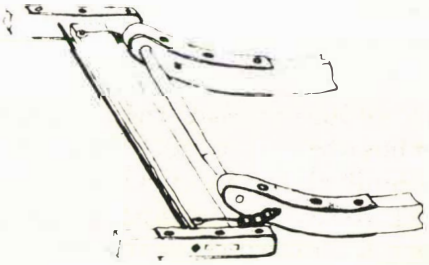
SNUBBING DEVICES FOR DOWN-GRADE HAULS

On down-grade hauls, especially with trains of sleds, snubbing is frequently necessary. The simplest snubbing device is merely a bridle chain looped under the runners of the sled; it drags along, biting in the ruts and retards the sled. Such chains are often bolted to the inner side of the runners of the rear sled in a two-sled rig. When a down grade is encountered the teamster brings the chain in front of the runner, and fastens it on the other side. Such snubbers tear up the roads and are hard on the sleds.



Bridle chain snubber

An automatic snubbing device for light rigs is a loosely attached thill with a sturdy and usually armored cross bar. It is attached so that when the load is moving faster than the motive power the front end of the runners will run up on the cross bar.

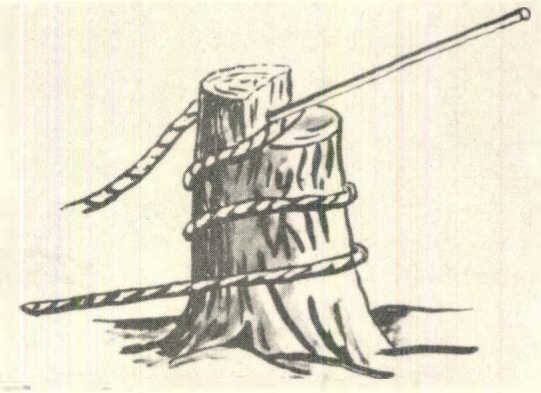


Automatic snubbing device

The road surface can also be treated to slow down sleds on moderate down grades. Sections of iced roads can be left uniced (sliding resistance on snow is greater than over ice). Hay, straw, or manure can be spread in the tracks. On iced roads it is best to cut holes in the track for insertion of these substances, so that they will not be quickly scattered around by sleds. These measures are often effective on grades of up to 10 percent. Hot sand is sometimes used in the ruts, but this requires a "road monkey" on duty continually to heat and sprinkle the sand; and it wears the sled runners rapidly. Another measure is to keep both snow and ice cleared away from the steep pitches, so that the sled runners travel on bare earth.

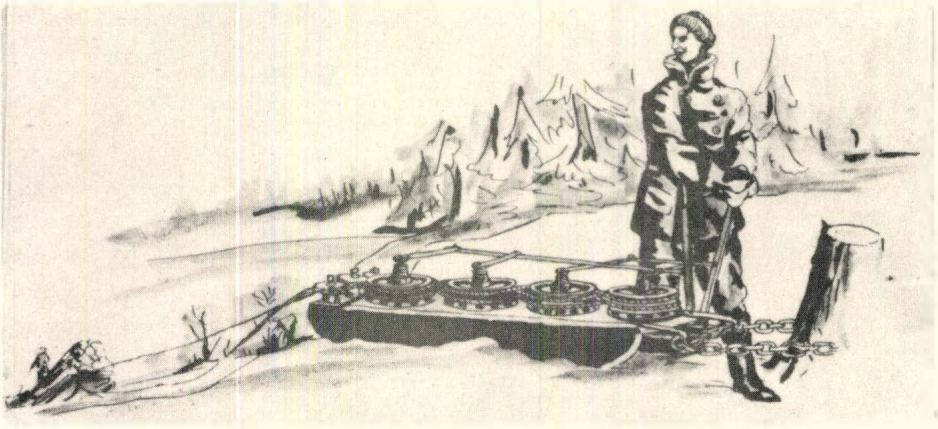
When the same ruts are used both on the downhill and uphill haul, these measures make the uphill haul more difficult, particularly for animal power. Consequently different ruts are often cut, or a go-back road is made, so that the sleds do not have to be dragged over the retarding devices as well as against the grade on the return trip.

For very steep pitches a cable is usually attached to the rear sled, and some sort of a snubbing device or brake is used to let the loads down the hill. Sometimes the cable is merely wrapped several times around a stump located at the top of the incline. A man regulates the letting out of the cable by hand, or by a lever.



Snubbing around a stump

A special snubbing machine, known as the Barienger brake, is used on many Northeastern operations. It has four to six cast-iron grooved sheaves mounted horizontally on a small, sturdy sled. A 3/8 to 3/4 inch steel cable is passed around the grooves in the sheaves. Each sheave has a hardwood friction block mounted below it and is attached to a lever so that it can be forced down on the block. One end of the cable is attached to the rear sled, and the snubber operator manipulates his levers to let the sled train down the hill at an even rate. If the road is crooked and he cannot see the sleds when they encounter unusually steep pitches, he can tie rags to the cable at the correct points to tell him when the heaviest braking is necessary. At the bottom of the slope the cable is detached, and the next train of sleds is let down by attaching the opposite end to the rear bunk.



Barienger brake used for lowering loaded sleds on steep grades

UPGRADE HAULS

Upgrade hauls with loaded sleds should be avoided if possible. When an upgrade haul must be made, there are several ways of doing it. One method is to divide the load. When sleds in trains are being hauled the train is split up at the foot of the slope and only a few of the sleds are hauled upgrade at a time. Even on a single-sled haul it is often possible to haul only a partial load up the hill, and then "top it off" with additional logs from a skidway located at the top of the ascent. With modern winch-equipped tractors the tractor driver can unhitch his load at the foot of the slope, climb the hill with the machine alone, and then reel in his load with the winch cable. In this way he can exert two to three times the power available at the drawbar. In the old days steam-powered hoists were often used in this way.

Another limiting factor on the size of the load that can be hauled is the power required to start out. This is due not only to the inertia of the load itself, but also to the likelihood that the sled runners will be frozen tight while the loading is going on. They can be broken loose most easily by hitting them with a wooden maul, or by giving them a jerk sideways with the power unit. A loosely coupled sled train is easier to start, because the power unit has to start only one sled at a time. Once started, the operator or driver should avoid stopping on level or uphill pitches, because of the difficulty of starting again. It is far better to stop on a down grade and block the sleds against slipping.

MOTIVE POWER FOR WINTER HAULING

Almost everything has been used to haul loads of bolts and logs over winter roads, from horses and oxen to steam hoists, steam log haulers, trucks, and tractors. The oxen, steam log haulers, and steam hoists have almost disappeared from Northeastern woods.

Horses are still used for short hauls of limited loads. A horse of about 1,500 pounds can exert about one horse power at a speed of 2 1/2 miles an hour, but for short periods it can increase its pull three to four times. Over a large part of the Northeast it is easier to get good teamsters than good tractor drivers, and when a horse gets sick or is otherwise put out of work it represents a smaller loss to the job than loss of a tractor.

Tractors can work more steadily, two or three shifts a day if need be, and can handle much more wood at a higher speed with less manpower. The bigger jobs are shifting over to tractors, especially for hauls of 1/2 mile or more, and records show that on a big job maintenance and operation of a diesel tractor is cheaper per unit of wood hauled than that of horses. Tractors are equally good on snow or iced roads. On the other hand, it is difficult to control tractor-hauled loads on steep down grades. When the sleds are pushing a crawler tractor, the driver must remember to use his steering controls exactly opposite to

the way he uses them in pulling a load.

Motor trucks are confined to iced roads and the longer hauls. They can haul out reasonably heavy loads about twice as fast as tractors, and four times as fast as horses. The loads, of course, have to be much more firmly bound to the sleds for hauling at these higher speeds. Ordinarily a load of wood, sandbags, or rocks is placed on the truck body to give it greater traction, and two or three sleds, each carrying about three cords of wood, are hauled behind it. For long hauls on carefully maintained iced roads of reasonable grade the truck has given a good account of itself.

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Some Manufacturers of Logging Sleds

A. Streich & Bro. Co., Oshkosh, Wisconsin.

Otaco Limited, Orillia, Ontario, Canada.

Fennia Limited, 1410 Stanley St., Montreal, Quebec, Canada.

Lombard Co., Waterville, Maine.